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Groundwater annelids from Gran Canaria and Fuerteventura (Canary Islands), with the description of two new species of *Namanereis* (Namanereidinae, Nereididae, Polychaeta)

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Abstract

The Canary Islands are the richest volcanic region in the world in subterranean adapted fauna, followed by the Hawaiian Islands and the Undara Cave in Australia. Most of the subterranean adapted aquatic fauna from the Canary Islands is restricted to the anchialine environments in La Corona lava tube in Lanzarote, while the oligohaline stygobiont fauna, usually found in groundwater or interstitial freshwaters, is scarcer and represented by a few species of amphipods, copepods, and a single polychaete annelid recorded from Fuerteventura and doubtfully identified as *Namanereis hummelincki* (*non* Augener, 1933) (Hartmann-Schröder, 1988). Two new species of polychaete annelids belonging to the subfamily Namanereidinae are described from Gran Canaria and Fuerteventura. Both species live in groundwater, are depigmented and eyeless, and have bifid jaws. Although they are seemingly more related to each other than to other members of the bifid-jaw group, *Namanereis canariarum* **sp. nov.** can be diagnosed by its relatively longer tentacular cirri and parapodial dorsal cirri, as well as the presence of pseudospiniger chaetae. In contrast, *Namanereis llanetensis* **sp. nov.** has shorter cirri and usually lacks pseudospiniger chaetae. *Namanereis canariarum* **sp. nov.** and *Namanereis llanetensis* **sp. nov.** increase to 20 the total number of currently described species within this enigmatic genus. More than half of those species are adapted to live in groundwaters.

Keywords
Oligohaline, Stygobiont, volcanic region, water mine, wells

Introduction

The Canary Islands hypogean fauna is highly interesting by its remarkable richness in adapted species, and the endemic character of most of them (Culver and Pipan 2009). In addition, a large part of the Canarian troglobionts are biogeographic relicts or belong to taxonomic groups absent in most continental faunas (Naranjo et al. 2020). The knowledge on the Canary Islands hypogean fauna has much evolved in recent times, especially since the 1980s, when local biologists began to systematically survey terrestrial volcanic caves (Oromí and Martín 1990) and other subterranean environments, such as the mesovoid shallow substratum (MSS) (Medina and Oromí 1990), pyroclastic deposits (Oromí et al. 2018), and artificial mines (Naranjo et al. 2020). Currentlly, the Canary Islands are the richest volcanic region in the world in subterranean fauna, with up to 294 troglobionts and stygobionts (Oromí et al. in press; Naranjo et al. 2020). In fact, Cueva de Felipe Reventón (37 species) and Cueva del Viento-Sobrado (36 species), both in Tenerife, are the second and third caves with the greatest number of troglobiont species in the world ranking (Culver and Pipan 2009), while La Corona lava tube, in Lanzarote, is the fourth richest in anchialine species (Culver and Pipan 2009; Martínez et al. 2016). The first stygobiont annelid recorded in the Canary Islands was the polynoid *Gesiella jameensis* (Hartmann-Schröder 1974), described for Jameos del Agua anchialine cave; followed by the scalibregmatid *Speleobregma lanzaroteum* from Túnel de la Atlántida (Berthelsen 1986). The first stygobiont interstitial cave species described from the Canary Islands were the fauveliopsid *Fauveliopsis jameoaquensis* and the nerillid *Leptonerilla diatomeophaga* from Jameos del Agua (Núñez et al. 1997). In the first two decades of the 21st century, studies of polychaetes in cave-dwelling environments intensified, both in Los Jameos del Agua and in submarine lava tubes of Tenerife (Cueva de los Cerebros), describing new nerilids, silids, scalibregmatids and protodrilids (Núñez et al. 2009; Worsaae et al. 2009, 2018, 2019; Martínez et al. 2013, 2016a, b). In contrast, in inland groundwater there are fewer species, mainly corresponding to amphipods of the genus *Pseudoniphargus* (Stock 1988; Sánchez 1989; Stokkan et al. 2018), three species of harpacticoid copepods from anchialine environments of Tenerife (Schminke 1971; Huys 1988) and a single annelid doubtfully identified as *Namanereis hummelincki* (*non* Augener, 1933), from inland brackish underground waters on Fuerteventura (Hartmann-Schröder 1988).

Polychaetes are mostly marine worms, characterized by their segmented body provided with chaetae (Read and Fauchald 2020). They cover some 9,000 species worldwide (Glasby 2008). The subfamily Namanereidinae, with the genera *Namanereis* and *Namalycastis*, is a monophyletic group with over 40 described species of nereidids adapted to live in low salinity habitats (Glasby et al. 2016), with some species that have even

colonized semi-terrestrial and subterranean environments (Solís-Weiss and Espinasa 1991; Glasby, 1999; Shoobs et al. 2016). The genus *Namanereis* currently contains about 20 valid species distributed from the tropics to high latitudes (Read and Bellan 2014; Conde-Vela 2017), almost exclusively occurring in intertidal and uplifted coastal areas, often far from the sea. Fourteen of the species of *Namanereis* are found in groundwater and hyporheic environments (Glasby et al. 2014; Conde-Vela 2017; Alves et al. 2018).

Recent surveys of freshwater aquifers through wells and water mines at the islands of Gran Canaria and Fuerteventura have yielded several individuals of *Namanereis* that could not be assigned to any known species (Fig. 1, see distribution). They likely belong to two species and show troglomorphic characters, such as depigmented epidermis and lack of eyes. Both species are described based on their morphological characters, since a previous molecular study with specimens from the Canary Islands have not been conclusive (Glasby et al. 2013; Shoobs et al. 2016).

Material and methods

A total of 20 individuals of *Namanereis* were collected from three localities: Los Llanetes water mine (27°59'12.63"N, 15°28'52.03"W, Valsequillo, Gran Canaria) (Fig. 1d), Fataga water mine (27°47'59.18"N, 15°35'12.57"W, Barranco de Fataga, Gran Canaria), and a well in Las Playitas (28°13'56.29"N, 13°59'10.41"W, Tuineje, Fuerteventura). Los Llanetes water mine is an artificial cavity excavated between slope debris and ravine alluvia, holding abundant troglobionts and stygobionts species (Naranjo et al. 2020). This mine is about 420 m above sea level on the east of Gran Canaria. The vegetation is composed of secondary shrub replacing the original thermophilic forests of *Pistacia atlantica* and *Olea cerasiformis*. The Fataga water mine is in the south of Gran Canaria, about 120 m a.s.l. The mine is excavated in ravine alluvia and has flooded sections with presence of the endemic stygobiont amphipod *Pseudoniphargus fontinalis* (Naranjo & Martín 2016). The specimens studied from the small coastal town of Las Playitas, at the east of Fuerteventura, near to Gran Tarajal, comes from an artificial brackish water well, excavated in a rural area at 14–18 m a.s.l.

The specimens were collected by hand and using meat baited traps, and preserved in 95% ethanol, except for one individual of *N. canariarum* sp. nov., which was fixed in 10% formaldehyde-seawater and preserved in 70% ethanol solution after manually protruding the pharynx. Parapodia from the anterior, mid, and posterior sections of the trunk were removed from individuals of the two species and mounted in semi-permanent microscopic slides using glycerine jelly. The morphological examinations were made with a compound Leica DMLB light microscope (LM) equipped with differential interference contrast (Nomarski). An Olympus DP70 camera was used to take digital images, whereas drawings were done using a camera-lucida drawing tube. The material was deposited in the collections of the Department of Animal Biology of the University of La Laguna (DBAULL), Museum of Natural Sciences of Tenerife (TFMC), and Museum & Art Gallery Northern Territory (NTM).

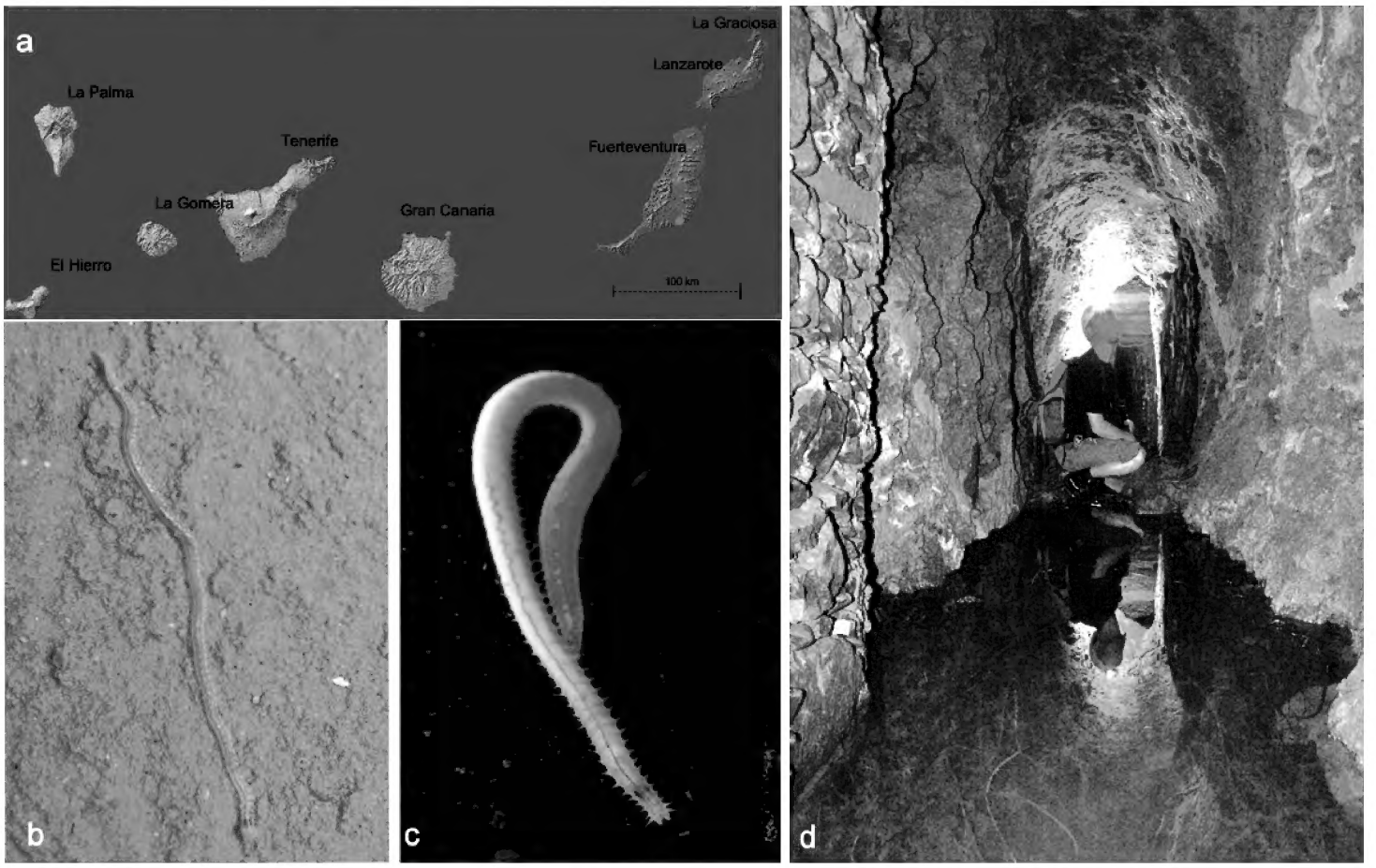

Figure 1. a Distribution in Canary Islands of *Namanereis canariarum* sp. nov. (yellow dot) and *Namanereis llanetensis* (red dot) **b** *Namanereis canariarum* sp. nov. live specimen, dorsal view **c** *Namanereis llanetensis* sp. nov. live specimen, dorsal view **d** Los Llanetes water mine (Valsequillo, Gran Canaria) type locality of *N. llanetensis* sp. nov.

Results

Family Nereididae Blainville 1818

Subfamily Namanereidinae Hartman, 1959

Type genus. *Namanereis* Chamberlin, 1919

Genus *Namanereis* Chamberlin, 1919

Namanereis Chamberlin, 1919. Mem. Mus. Comp. Zool. Harv. Coll., 48: 194

Type species. *Lycastis quadraticeps* Blanchard, 1849

Namanereis canariarum sp. nov.

http://zoobank.org/B7836D85-CC52-4284-A34E-F1BA66BB8BC0
Figs 1a, b; 2; 4a–d

Namanereis hummelincki.– Hartmann-Schröder, 1988: 181–182. *Non* Augener, 1933.
Namanereis sp. nov. 1 Glasby, Fiege & Van Damme, 2014: 28 (Table 1).

Type locality. Canary Islands, Fuerteventura, Las Playitas (28°13'55.42"N, 13°59'4.92"W) 14 m above sea level, brackish water well.

Type material. ***Holotype***: TFMCBM-AN/240, coll. J. Núñez, 8-2-2002; 2 ***Paratypes***: TFMCBM-AN/241, 2 spec., Fuerteventura, Las Playitas, Canary Islands, 28°13'56.73"N, 13°59'10.26"W, 18 m above sea level, coll. L. Santos & J.R. Docoito, 28-9-2011.

Additional material. Fataga water mine (Barranco de Fataga, Gran Canaria, (27°47'59.18"N, 15°35'12.57"W, 160 m above sea level), 12 spec. (6 spec. TFM-CBM-AN/242; 6 spec. DBAULL/2020), coll. P. Oromí & M. Naranjo, 6-12-2013.

Comparative material examined. Material identified by G. Hartmann-Schröder (1988) as *Namanereis hummelincki* from Canary Islands, Fuerteventura, well S. of Betancuria, 400 m a.s.l., coll. J.H. Stock, 4-5-1987, 8 ex ZMA VPol 2953 (now in Naturalis, Leiden).

Description. Holotype with 133 chaetigers, 46 mm long and 0.7 mm wide excluding parapodia and chaetae. Two paratypes, fragmented, one with 77 and the other with 88 chaetigers; one paratype female with gametes in the coelom.

Living individuals with depigmented epidermis, highlighting the red dorsal blood vessel over the fleshy pink coloured body. Body slender, with uniform width in the anterior and middle regions, abruptly tapering only near the posterior end; trunk convex dorsally and flattened ventrally (Fig. 1b).

Prostomium semi-circular in shape, slightly wider than long; cleft absent, shallow dorsal hollow present; two short conical frontal antennae, smooth, extending beyond tip of palpophore; palps broad and globose, biarticulated, with globular palpostyles; eyes absent (Fig. 2a). Tentacular segment as wide as first chaetiger, but half its length, bearing three pairs of short tentacular cirri, cirrophores inconspicuous, cirrostyles smooth and tapering. The longest pair of cirrostyles extends to reach the third chaetiger (Fig. 2a). Pharynx divided into a maxillary and an oral region, lacking paragnaths or papillae, but possessing a pair of delta-shaped jaws, dark, with only bifid terminal teeth (Figs 2a, b, 4a).

Parapodia with notopodial branch reduced to the inner acicula; neuropodium well-developed, acicular neuropodial ligule subconical (Fig. 2c, d) with prominent acicular lobes (Fig. 4b). Dorsal cirri acuminated, similar in length throughout the body and clearly surpassing the parapodial lobe; ventral cirri short and thin, being about a third of the length of the dorsal cirri (Fig. 2c, d). Notochaetae absent, neurochaetae arrangement as in Type A (Glasby 1999), although with slight modifications. Overall, less than 7 chaetae on each parapodium; supraneuroacicular chaetae normally includes 1 sesquigomph spiniger chaeta in the postacicular fascicle (Fig. 2h, i) and 1 heterogomph falciger chaeta in the preacicular fascicle throughout the whole body (Fig. 2e, k). Subneuroacicular chaetae normally includes 1 heterogomph pseudospiniger chaeta (Figs 2g, j; 4c) and 2–3 falciger chaetae in the preacicular fascicles (Figs 2f, l, 4d); less frequently 2 pseudospiniger chaetae, and exceptionally up to 3 falciger and no pseudospiniger chaetae might be found. In the posterior region, starting from chaetiger 60, pseudospiniger chaetae are generally longer, resembling spiniger chaetae. Supraneuroacicular falciger chaetae in chaetiger 10 with blades 4.90× longer than width of shaft head (4.7–5.0), finely serrated, about 30 teeth, length of the teeth decreasing towards

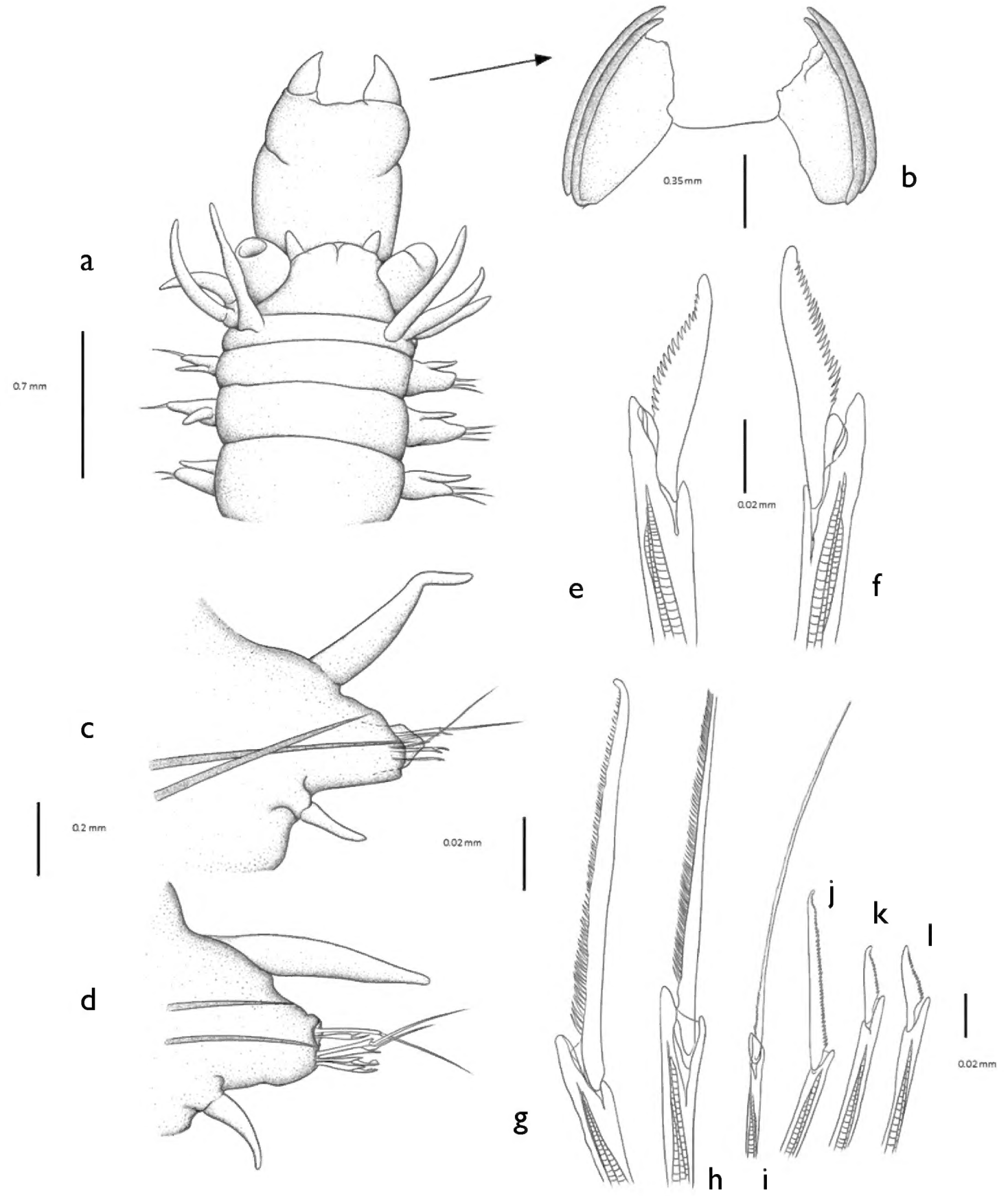

Figure 2. *Namanereis canariarum* sp. nov. **a** anterior end, everted pharynx, dorsal view **b** jaw pieces of the pharynx, frontal view **c** parapodium from chaetiger 10 **d** parapodium from chaetiger 60 **e** supraneuroacicular falciger, chaetiger 30 **f** subneuroacicular falciger, chaetiger 10 **g** subneuroacicular pseudospiniger, chaetiger 30 **h** supraneuroacicular spiniger, blade not fully shown, chaetiger 10 **i** supraneuroacicular spiniger, blade fully shown, chaetiger 10 **j** subneuroacicular pseudospiniger, chaetiger 10 **k** supraneuroacicular falciger, chaetiger 30 **l** subneuroacicular falciger, chaetiger 30.

the apex. Subneuroacicular falciger chaetae in chaetiger 10 with blades 5.5× longer than width of shaft head (5.2–5.7), finely serrated (similar to supraneuroacicular falcigers), length of the teeth decreasing towards the apex. Supraneuroacicular sesquigomph spiniger chaetae in chaetiger 10 with boss (vertical length of blade joint opposite collar) of the joint about 1.6× length of collar. Aciculae dark honey coloured. Pygidium with terminal anus, and two short ventrolateral anal cirri, slender and smooth.

Remarks. Morphologically, *Namanereis canariarum* sp. nov. belongs to the bifid-jaw group of *Namanereis*: this includes *N. araps* Glasby, 1997 (Arabian Peninsula), *N. cavernicola* (Solís-Weiss & Espinasa 1991) (Mexico, Caribbean side), *N. christopheri* Conde-Vela 2017 (Saint Vincent, Caribbean), *N. hummelincki* (Augener 1933) (Caribbean), *N. minuta* Glasby, 1999 (Caribbean), *N. llanetensis* sp. nov. (Canary Islands), *N. serratis* Glasby, 1999 (Caribbean), *N. socotrensis* Glasby, Fiege & Van Damme, 2014 (Socotra Archipelago) and *N. stocki* Glasby, 1999 (Caribbean). The new species can be distinguished from *N. cavernicola*, *N. minuta* and *N. stocki* by the number and size of teeth on the blades of the supraneuroacicular falciger chaetae. *Namanereis canariarum* has 20–30 moderate-sized teeth, compared to 35–80 very fine teeth in *N. cavernicola*, 50–60 fine teeth in *N. minuta*, and 9–14 moderate-sized teeth in *N. stocki*. Furthermore, *N. canariarum* has much shorter antennae and tentacular cirri than the three aforementioned species. On the other hand, *N. minuta* and *N. stocki* differ from *N. canariarum* in having four pairs of tentacular cirri. *Namanereis canariarum* has shorter tentacular cirri and smooth antennae, unlike *N. araps* that has faintly jointed and longer tentacular cirri, with the posterodorsal one extending back to chaetiger 5; antennae in *N. araps* slightly exceed the length of the prostomium. *Namanereis canariarum* is most similar to *N. hummelincki*, *N. christopheri*, and *N. llanetensis* sp. nov. However, *N. canariarum* differs from (1) *N. llanetensis* sp. nov. in the longer tentacular and parapodial dorsal cirri, as well as the absence of pseudospiniger chaetae; (2) from *N. christopheri* in the absence of long pseudospiniger chaetae, as well as the presence of shorter and most uniform spinulation in the falciger chaetae, with a longer blade with a greater number of denticles than in *N. canariarum*; (3) and from *N. hummelincki* by the shape of the jaws, in *N. canariarum* they are delta-shaped in the toothless area, and *N. hummelincki* is oblong in shape; as well as the greater number of pseudospiniger chaetae per parapodium in *N. hummelincki*. Finally, *N. canariarum* differs from *N. serratis* and *N. socotrensis* because these two species only have heterogomph falcigers setae in subneuroacicular fascicle.

Habitat. The type material was collected from a brackish water well at 14 metres above sea level and about 400 metres from the coastline, located on the south of Fuerteventura. Additional material comes from the southern sector of Gran Canaria, collected in a water mine about 140 m a.s.l.. The mine had waterlogged sections rich in plant roots and slime. The stygobiont amphipod *Pseudoniphargus fontinalis* and the diving beetle *Bidessus minutissimus* (Naranjo & Martín 2016) were also found in this locality.

Distribution. Type locality: Canary Islands, Fuerteventura, Las Playitas. Other specimens from Fataga water mine, Barranco de Fataga, Gran Canaria.

Etymology. The species name derives from the Canary archipelago, in plural for being found in two islands.

***Namanereis llanetensis* sp. nov.**
http://zoobank.org/99E2991B-A2E2-4587-BF83-3CAFDA747571
Figs 1a, c, 3, 4e, f

Namanereis sp. nov. 2 Glasby, Fiege & Van Damme, 2014: 28 (Table 1).

Type locality. Canary Islands, Gran Canaria, Los Llanetes water mine (Valsequillo) (27°59'12.63"N, 15°28'52.03"W) 415 m above sea level.

Type material. ***Holotype***: TFMCBM-AN/243, coll. M. Naranjo, 8-6-2010. ***Paratypes***: TFMCBM-AN/244, 1 spec., coll. M. Naranjo, 28-7-2010; TFMCBM-AN/245, 1 spec., coll. M. Naranjo, 12-8-2010; Los Llanetes water mine (Valsequillo, Gran Canaria), 1 spec., coll. M. Naranjo, 28-7-2010; 1 spec., coll. C. González, 12-8-2010.

Description. Holotype with 86 chaetigers, 34 mm long and 1.3 mm wide excluding parapodia and chaetae. Paratypes with 83–88 chaetigers, 28–35 mm long and 0.8–1.0 mm wide; one paratype female with gametes in coelom (Fig. 1c).

Living individuals with depigmented epidermis, highlighting the red dorsal blood vessel over the fleshy pink coloured body. Body uniform in width in anterior and middle region, tapering abruptly only in far posterior region; trunk convex dorsally and flattened ventrally (Fig. 1c).

Prostomium hexagonal, two times wider than long, without a cleft but with a shallow dorsal hollow; two conical frontal antennae, smooth, extending beyond the tip of palpostyle; palps broad and globose, biarticulated, with globular palpostyles; eyes absent (Fig. 3a). Tentacular segment as wide as first chaetiger, but slightly shorter in length. Three pairs of short tentacular cirri with indistinct cirrophores, and smooth tapering cirrostyles, the longest posterodorsal pair extending posteriorly to chaetiger 1–2 (Fig. 3a). Pharynx without paragnaths or papillae, but with a pair of brown, delta-shaped jaws, bearing bifid terminal teeth (Fig. 3b, c).

Parapodia with notopodial branch reduced to the inner acicula; neuropodium well-developed, acicular neuropodial ligule subconical (Fig. 3e, f). Dorsal cirri similar in length throughout the trunk, not surpassing the parapodial lobe; ventral cirri short, only about half as dorsal cirri in length (Fig. 3e, f). Notochaetae absent, neurochaetae as in Type A (Glasby 1999), with slight arrangement modifications; 7 chaetae in each parapodium. Supraneuroacicular chaetae normally include 2 sesquigomph spiniger chaetae in postacicular fascicles (Fig. 3k, n) and 1 heterogomph falciger chaeta in preacicular fascicles (Fig. 3g, i), less frequently 1 sesquigomph spiniger chaeta and exceptionally up to 3 and no heterogomph falciger chaetae ; subneuroacicular chaetae normally include 2 heterogomph spiniger chaetae in postacicular fascicles (Fig. 3l, m) with long basal spinulation (Fig. 4e), and 2–3 heterogomph falciger chaetae in preacicular fascicles (Figs 3h, j, 4f), less frequently 1 heterogomph spiniger chaeta or none; exceptionally in anterior parapodia 4 heterogomph falciger and no spiniger chaetae; 1 heterogomph pseudospiniger chaeta and 3 heterogomph falciger chaetae were observed on a single anterior parapodium. No blade length gradation was observed in heterogomph falciger chaetae. Supraneuroacicular falciger chaetae in

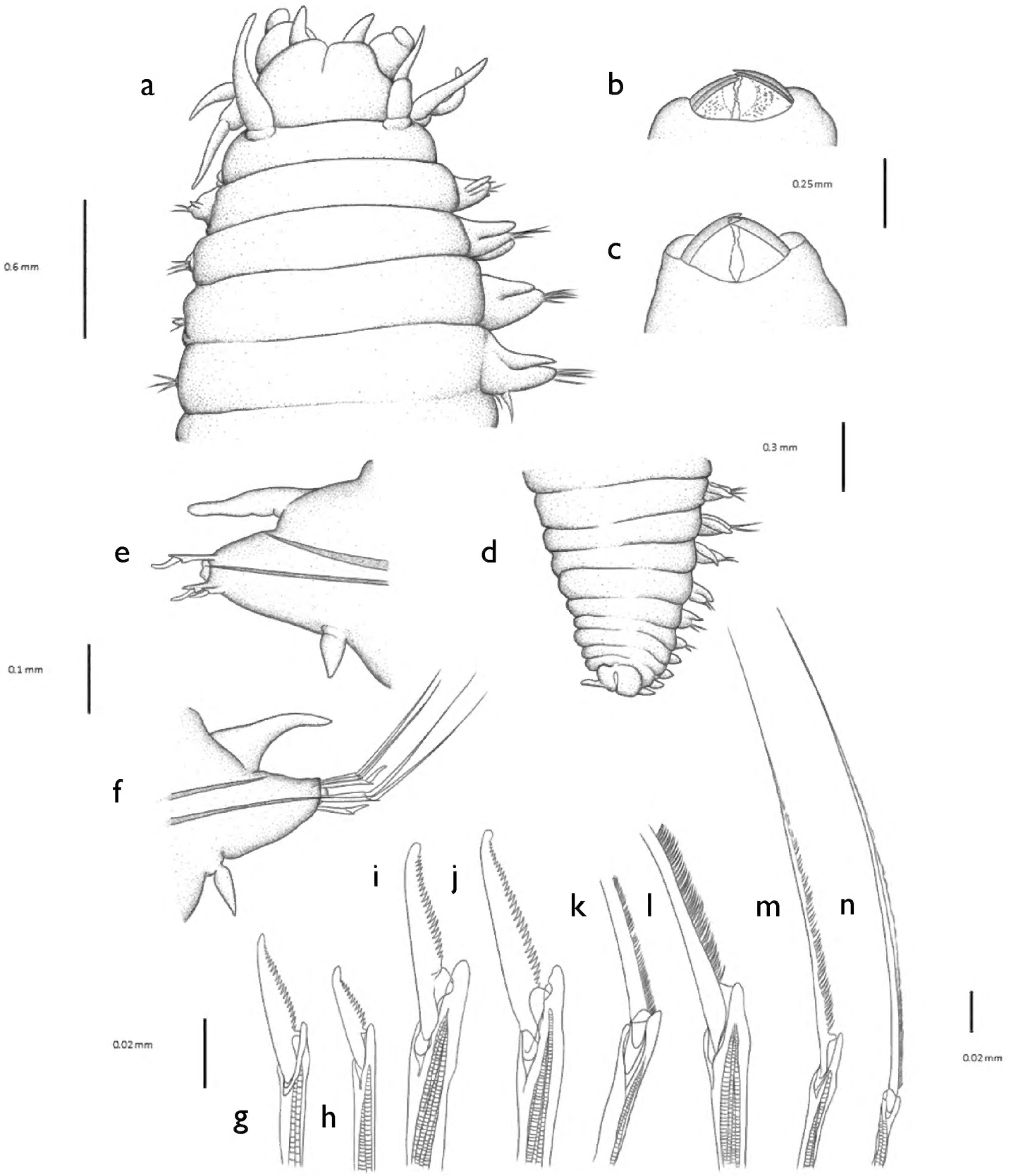

Figure 3. *Namanereis llanetensis* sp. nov. **a** anterior end, dorsal view **b** everted pharynx with jaws, dorsal view **c** jaws ventral view **d** posterior end, dorsal view **e** parapodium from chaetiger 3 **f** parapodium from chaetiger 60 **g** supraneuroacicular falciger, chaetiger 60 **h** subneuroacicular falciger, chaetiger 3 **i** supraneuroacicular falciger, chaetiger 3 **j** subneuroacicular falciger, chaetiger 3 **k** supraneuroacicular spiniger, blade not fully shown, chaetiger 3 **l** subneuropodial spiniger, blade not fully shown, chaetiger 10 **m** subneuroacicular spiniger, blade fully shown, chaetiger 60 **n** supraneuroacicular spiniger, blade fully shown, chaetiger 60.

chaetiger 10 with blades 3.8× longer than width of shaft head (3.6–4.0), with 18 finely serrated teeth (15–22), length of the teeth decreasing towards the apex. Subneuroacicular falciger chaetae in chaetiger 10 with blades 4.3× longer than width of

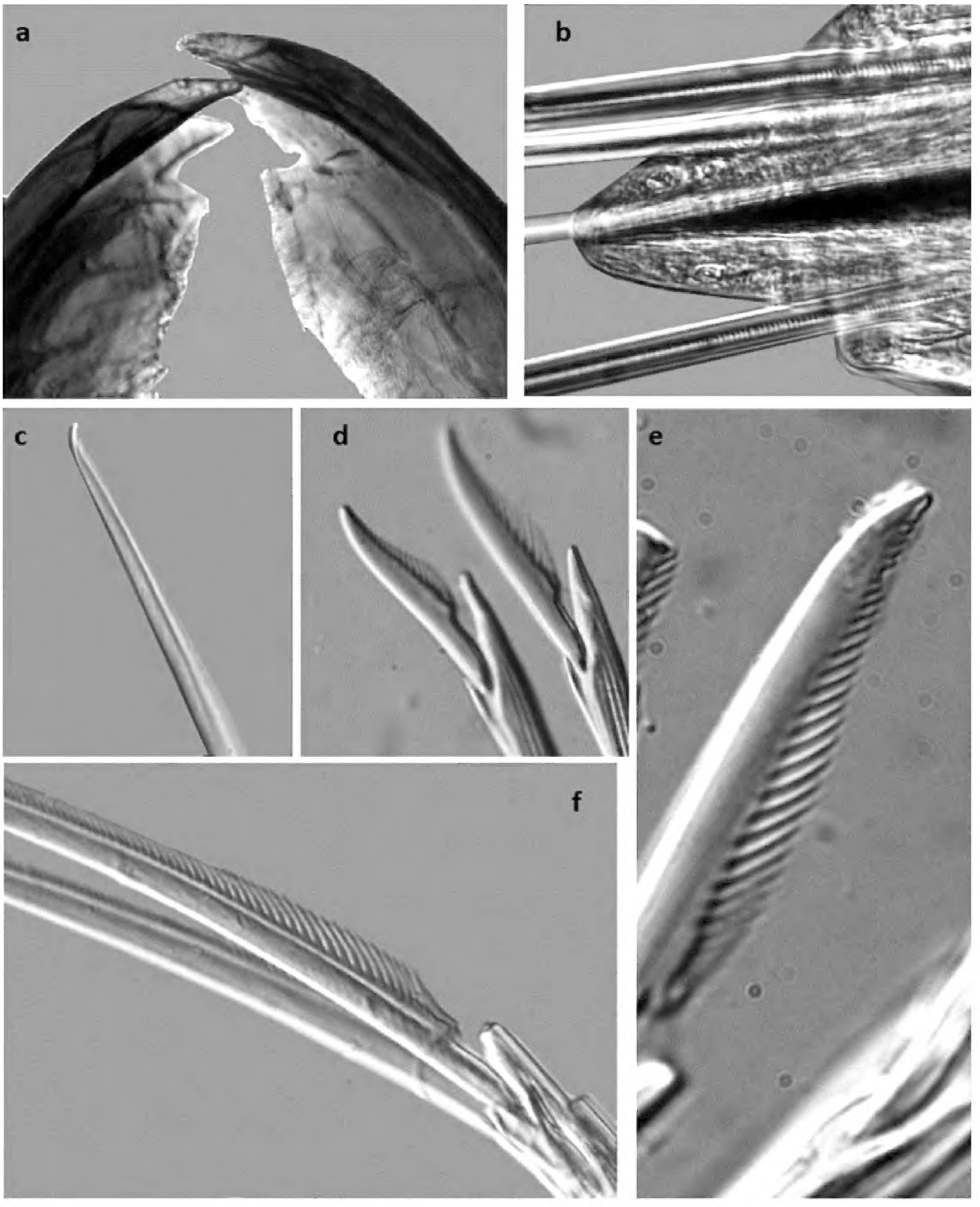

Figure 4. *Namanereis canariarum* sp. nov. **a** jaw pieces of the pharynx, ventral view **b** parapodium, detail of the acicular lobes **c** pseudospiniger blade tip **d** subneuroacicular heterogomph falciger, chaetiger 60. *Namanereis llanetensis* sp. nov. **e** Holotype, detail of the basal spinulation, hererogomph spiniger, chaetiger 10 **f** Holotype, detail of spinulation, subneuroacicular heterogomph falciger, chaetiger 10.

shaft head (4.1–4.5), and 16 (15–20), length of the teeth decreasing towards the apex. Supraneuroacicular sesquigomph spiniger chaetae in chaetiger 10 with boss (vertical length of blade joint opposite collar) about 3.0 times length of collar. Aciculae dark

honey coloured. Pygidium with terminal anus and two short ventrolateral anal cirri, slender and smooth (Fig. 3d).

Remarks. *Namanereis llanetensis* sp. nov. also belongs to the so-called bifid-jaw group of groundwater *Namanereis*, bearing only a single pair of terminal teeth in the jaws (Glasby et al. 2014). *Namanereis llanetensis* can be distinguished from all the above described species except *N. serratis* by the absence of long-bladed falcigers (= pseudospiniger chaetae) in the subacicular neuropodia; although, as reported above it can exceptionally occur in some anterior parapodia. The new species can be distinguished from *N. serratis* due to the greater number of teeth (and finer teeth) on the blades of the supraneuroacicular falcigers (only 6–11 coarse teeth in *N. serratis*).

Habitat.- Type material from a freshwater mine extending into an aquifer at 415 metres above sea level, located on the eastern sector of the island of Gran Canaria. Individuals were collected in the flooded sections of the mine, with abundant plant roots, were the stygobiont amphipod *Pseudoniphargus pedunculatus* was also found (Naranjo et al. 2014).

Distribution. Type locality: Canary Islands, Gran Canaria, Valsequillo, Los Llanetes water mine.

Etymology. The species is name after the type locality "Llanetes water mine".

Discussion

The genus *Namanereis* has a wide distribution ranging from America to Oceania, may be resulting from vicariance after the fragmentation of Gondwana in Late Jurassic (Glasby et al. 2014). The marine ancestor of *Namanereis* group reached epigean environments in the late Jurassic, whereas the widely distributed, marine ancestor of bifid-jawed *Namanereis* group colonized semiterrestrial and groundwater environments in the Cretaceous (Glasby et al. 2014). During posterior uplifting events, these ancestors were trapped and obligated to colonize the subterranean realm (Glasby et al. 2014). This hypothesis is consistent with the *Namanereis* colonization of the Canary Islands, where uplifting events and regression sea has been described (Meco et al. 2007). The Canary archipelago emerged in the Miocene and is located 100 km off the coast of Africa. Therefore, the Canary Islands had to be colonized by marine *Namanereis* ancestors from the African continent, ancient islands of Palaeo-Canaries (Carracedo 2011), or the Mediterranean basin.

Shoobs et al. (2016) found that the two new Canarian species together were sister to specimens identified as *N. hummelincki* from Montserrat, Caribbean. This is not surprising considering the general morphological similarity between the Caribbean *N. hummelincki* and *N. canariarum.* However, as we have shown here, material from Fuerteventura identified as *N. hummelincki* by Hartmann-Schröder (1988) does agree in detail with the specimens of *N. canariarum* collected both in Fuerteventura and Gran Canaria. Thus, the widely distributed Caribbean species *N. hummelincki* does not occur in the Canary Islands. As described above, the differences between *N. canariarum* and *N. llanetensis* are

in the relative length of tentacular and dorsal cirri (longer in *N. canariarum* sp. nov.), the number of teeth on the supraneuroacicular falciger (15–22 in *N. canariarum* and about 30 in *N. llanetensis*), and the presence of heterogomph pseudospingerous in *N. canariarum* which are essentially absent in *N. llanetensis*. In addition, although part of these differences might be explained by post-mortem contraction in the fixed material, the specimens of *N. llanetensis* are more robust and have fewer chaetigers than the those of *N. canariarum*, which are more elongated, filiform in appearance and have greater number of segments. Although both COI and histone H3 data for the two new species have been archived on Genbank, they are, at least partially contaminated, limiting the amount of comparative data available for a molecular analysis of the genus (Glasby et al. 2013).

In an ecological classification, obligate residents of subterranean habitats in aquatic systems are called stygobionts. Hence, *Namanereis canariarum* and *N. llanetensis* must be considered as stygobionts since they inhabit only freshwater aquifers of Fuerteventura and Gran Canaria. Furthermore, they also show troglomorphic characters, such as depigmented epidermis and eyelessness, in contrast with epigean species of the same genus that have developed eyes and are well pigmented (Glasby et al. 2014). In addition, *N.canariarum* and *N. llanetensis* have bifid jaws that can be an adaptative character to subterranean habitats (Conde-Vela 2017). Glasby et al. (2013) suggest that broadly dished jaws reflect a possible shift toward a primarily deposit-feeding. In the water mines where *N. canariarum* and *N. llanetensis* occur, they can be observed wandering between submerged roots or moving in the mud, where it is supposed they feed on organic detritus and small invertebrates. *Namanereis* occurs in the eastern islands of the Archipelago, with the exception of Lanzarote and La Graciosa, where their scarce wells and water mines have not been explored. *Namanereis* species have never been found in the western islands of the Canary archipelago, which could be due to the low exploration of the aquifer, but these islands are also much younger than Gran Canaria and Fuerteventura, and the colonization of the *Namanereis* ancestor could take place in the early or medium Miocene (Glasby et al. 2014).

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